Project Introduction

OKSI and Professor Frank Dellaert of Georgia Institute of Technology (Georgia Tech) are teaming up to develop an ultra-low cost passive low-SWaP spherical situation awareness sense/avoid system based upon monocular stereo vision (i.e., stereo-from-motion) for small UAS platforms operating within the NAS. When flying close to the ground (e.g., during takeoff and landing) obstacles such as cars, trees, buildings, power lines, people, and so on are not equipped with beacons. In this setting, the ability to actively detect obstacles within the environment in real-time and to take evasive maneuvers to avoid collisions is a required capability for safe operation in the NAS. Currently, there are no existing technologies that sufficiently address the sense/avoid problem associated with operation of small UAS platforms (<55lbs) operating within the NAS. To this end, OKSI is developing the Stereo Obstacle Avoidance Rig (SOAR) that will provide a complete solution to the sense/avoid problem for small UAS platforms. The SOAR system utilizes a video stream from a distributed aperture array of cell phone cameras combined with state-of-the-art single-camera stereo vision algorithms in order to construct accurate 3D environmental maps in real-time.

Primary U.S. Work Locations and Key Partners

SOAR - Stereo Obstacle Avoidance Rig, Phase II

Table of Contents

Organizations Performing Work	Role	Type	Location
Opto-Knowledge Systems, Inc.(OKSI)	Lead Organization	Industry	Torrance, California
🟢Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

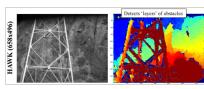| Primary U.S. Work Locations	
California	Virginia

Project Transitions

▶ **May 2015:** Project Start

✔ **May 2018:** Closed out

Closeout Documentation:
- Final Summary Chart*(https://techport.nasa.gov/file/137747)*

Images

Briefing Chart
SOAR - Stereo Obstacle Avoidance Rig Briefing Chart
(https://techport.nasa.gov/image/133172)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Opto-Knowledge Systems, Inc. (OKSI)

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

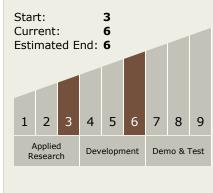## Project Management

Program Director:
Jason L Kessler

Program Manager:
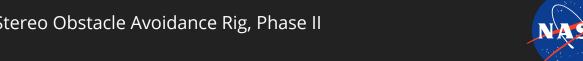Carlos Torrez

Principal Investigator:
Chris Holmesparker

Technology Maturity (TRL)

Start: **3**
Current: **6**
Estimated End: **6**

1	2	3	4	5	6	7	8	9
	Applied Research			Development			Demo & Test	

Technology Areas

Primary:

- TX10 Autonomous Systems
  └ TX10.2 Reasoning and Acting
    └ TX10.2.4 Execution and Control

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System